A1000

Attachment H

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: Adult Fall-Run Chinook Salmon Movement in the lower San Joaquin River & South Delta.

Applicant Name: Kevan Urquhart

Mailing Address: 4001 N. Wilson Way, Stockton, CA 95205

Telephone: (209) 948-7800

Fax: (209) 946-6355

Amount of funding requested: $ 348,875 for 1 years

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision: see page __ of the Proposal Solicitation Package for more information.

- ☒ Fish Passage Assessment
- ☐ Fish Passage Improvements
- ☐ Floodplain and Habitat Restoration
- ☐ Gravel Restoration
- ☐ Fish Harvest
- ☐ Species Life History Studies
- ☐ Watershed Planning/Implementation
- ☐ Education
- ☐ Fish Screen Evaluations - Alternatives and Biological Priorities

Indicate the geographic area of your proposal (check only one box):

- ☐ Sacramento River Mainstem
- ☐ Sacramento Tributary: _____
- ☒ Delta
- ☐ East Side Delta Tributary: _____
- ☐ Suisun Marsh and Bay
- ☐ San Joaquin Tributary: _____
- ☐ San Joaquin River Mainstem
- ☐ Other: _____
- ☐ Landscape (entire Bay-Delta watershed)
- ☐ North Bay: _____

Indicate the primary species which the proposal addresses (check no more than two boxes):

- ☒ San Joaquin and East-side Delta tributaries fall-run chinook salmon
- ☐ Winter-run chinook salmon
- ☐ Spring-run chinook salmon
- ☐ Late-fall run chinook salmon
- ☐ Fall-run chinook salmon
- ☐ Delta smelt
- ☐ Longfin smelt
- ☐ Splittail
- ☐ Steelhead trout
- ☐ Green sturgeon
- ☐ Striped bass
- ☐ Migratory birds

COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

☒	State agency	☐	Federal agency
☐	Public/Non-profit joint venture	☐	Non-profit
☐	Local government/district	☐	Private party
☐	University	☐	Other: _____

Indicate the type of project (check only one box):

☐	Planning	☐	Implementation
☒	Monitoring	☐	Education
☐	Research		

By signing below, the applicant declares the following:

(1) the truthfulness of all representations in their proposal;

(2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and

(3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

_____

(Signature of Applicant)

Title: **Adult Fall-Run Chinook Salmon Movement in the Lower San Joaquin River and South Delta**

Applicant: Kevan Urquhart
California Department of Fish and Game
Bay-Delta and Special Water Projects Division
4001 N. Wilson Way
Stockton, California 95205
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Type of Organization: State Agency

Tax Status: Not Applicable

Tax Identification Number and/or Contractor License: Not Applicable

Participants/Collaborators: DFG Bay-Delta Division Water Project Planning and Evaluation staff

EXECUTIVE SUMMARY

Title: **Adult Fall-Run Chinook Salmon Movement in the Lower San Joaquin River and South Delta**

Applicant: Kevan Urquhart
California Department of Fish and Game
Bay-Delta and Special Water Projects Division
4001 N. Wilson Way
Stockton, California 95205
Phone: (209) 948-7800
Fax: (209) 946-6355

Project Description and Primary Biological/Ecological Objectives:

The Department of Fish and Game (DFG) requests funds to monitor the upstream movement of fall-run chinook salmon in the lower San Joaquin River (SJR) and south Delta. This information would be analyzed to determine whether the installation of three south Delta temporary barriers (SDTB) and the head of Old River barrier (HORB) or low dissolved oxygen (DO) levels are significant impediments to upstream migration. A previous fish passage study indicates that these barriers have the potential to block upstream movement of a significant fraction of the San Joaquin River run (Hallock et al. 1970). Low DO in the Stockton Deep Water Channel (SDWC) or downstream in the mainstem San Joaquin River has been shown to block the upstream migration of adult San Joaquin fall-run chinook salmon. We propose to capture and tag adult fall-run chinook salmon in the lower SJR and track them upstream past the head of Old River. We would describe the use of different immigration routes through the south Delta and document any barriers or low DO areas that delay or block adult salmon passage.

The primary objectives of the project are 1) to describe the upstream migration routes of adult chinook salmon in the south Delta, 2) determine the effects of SDTB and HORB on adult salmon passage, and 3) determine whether low DO conditions are blocking or delaying upstream migration.

Project Tasks and Schedule:

Starting in the spring of 1999, DFG will coordinate with the existing Interim South Delta Program (ISDP) agencies and their fish monitoring programs and cooperatively develop an adult chinook salmon movement study plan for monitoring those fish that move through the lower San Joaquin River and south Delta channels. In the fall of 1999, adult fall-run chinook salmon will be captured, tagged with ultrasonic tags, released, and their movement tracked through the study area using mobile and stationary receivers. Special emphasis will be given to fish that will ascend the upper tributaries of the San Joaquin River. Water quality conditions will be measured in the main migration routes concurrent with the biotelemetry surveys. Any migration delays or blockages will be noted. After completion of the tracking period in late fall of 1999, the telemetry data will be analyzed and movement information compared with existing or proposed

barriers, flow and water quality conditions. In the spring of 2000, a final progress report will be submitted describing the proportion of adult chinook salmon that use alternative routes to ascend the lower San Joaquin River, identify any barriers or water quality conditions that inhibit the upstream movement of adult salmon, and provide recommendations for improving upstream passage.

Project Justification:

The CALFED Bay-Delta Program has identified diversion dams without fish passage facilities as a major stressor contributing to the decline of priority species. There is little information whether installation of HORB has reduced the annual DO sag in the SJR to allow unimpeded passage of adult chinook salmon. It is also unclear whether SDTB barriers influence the migration patterns of fall-run chinook salmon. Current monitoring programs are inadequate to conclusively define patterns of chinook salmon immigration in Middle and Old River, and Grant Line Canal, and older literature suggest these routes were used historically.

Budget Costs and Third Party Impacts

DFG is requesting $348,875 over a one-year period. DFG will ask DWR to share some of the capital costs of the telemetry equipment and up to 50% of the permanent staff salaries. No third party impacts have been identified.

Applicant Qualifications

This project will be conducted by the DFG Fish Facilities Research Unit that has been conducting applied bioengineering research on fish passage, screening, and agricultural/municipal/SWP/CVP diversions for more than 25 years. The Unit is within the Fish Facilities Program of the Bay-Delta and Special Water Projects Division, which has conducted applied research in the S.F. Bay-Estuary for more than 35 years. Participants of the proposed study include a senior project manager, a research investigator, a field biologist with telemetry training, and two experienced fishery technicians.

Monitoring and Data Evaluation

Qualitative and quantitative evaluation of the project objectives will be accomplished through the publication of quarterly status reports and by their distribution to a technical advisory team, the CALFED contract manager, and other appropriate representatives for peer review. If required, an Ecological and Biological Monitoring Plan can be prepared, submitted, and approved by CALFED before the start of the field work. A final project report will be prepared and submitted upon completion of all the project tasks.

Coordination with Other Programs/Compatibility with CALFED Objectives

DFG staff has begun contacting the appropriate public agency representatives about preparation and future implementation of this proposal (e.g., DFG BDD Water Project Planning and Evaluation Section, DFG Inland Fisheries Division, DWR, USFWS, and USBR).

PROJECT DESCRIPTION

Project Description and Approach

* Coordinate with the Interim South Delta Program (ISDP) fish monitoring programs and cooperatively develop an adult chinook salmon movement study plan for the lower San Joaquin River and south Delta.
* Capture, tag, release, and track adult fall-run chinook salmon found in the lower San Joaquin River and south Delta using ultrasonic telemetry. Special emphasis will be given to fish that will ascend the San Joaquin River.
* Measure the concurrent water quality conditions in the main channels used for upstream salmon passage.
* Determine the extent that adult fall chinook salmon use Middle and Old River channels to ascend the San Joaquin River.
* Identify any migration delays or blockages observed.
* Evaluate the need for fish passage devices or operational management actions to improve fish passage and provide recommendations to improve adult salmon passage.

A minimum of 150 adult fall-run chinook salmon will be captured, tagged with ultrasonic transmitters, and released in the lower San Joaquin, Middle, and Old Rivers. Fish collection will occur from September through November 1999, during periods when water temperatures are $\leq 20^{o}$C. The fish will be tagged and released at the site of capture.

Fixed location and mobile receivers will be used to determine the location of the tagged salmon. Tagged salmon will be monitored using mobile receivers from the lower San Joaquin River through the south Delta to upstream of HORB on the mainstem San Joaquin River. Mobile monitoring will occur continuously for the first 48 hours of tag deployment and daily (8 hours) after that. Stationary receivers (minimum of 10 receivers) will monitor continuously at sites on the Middle, Old, mainstem San Joaquin and Sacramento rivers, and possibly near the confluence of the Mokelumne and Cosumnes Rivers. Some of the fixed receivers may be moved to alternate sites depending on the installation of specific ISDP barriers. Tagged salmon will be monitored for one month or until 1) no fish are detected in the monitoring area, or 2) all fish have migrated out of the study area. Fish movement, direction, location, mortality, and sites of capture will be recorded. Other environmental data will be gathered such as dissolved oxygen, temperature, E.C., channel depth, appropriate water flow estimates from Department of Water Resources, and tidal stage. Fish length, scale samples, and adipose fin tissue samples will be taken and archived.

Data will be analyzed to determine any trends in fish migration, migratory rates, and any delays or blockages associated with the temporary barriers or other phenomenon (e.g., dissolved oxygen sag at the Stockton Deep Water Channel, high water temperatures). The percentage of salmon that use routes other than the mainstem river channel to migrate upstream will be determined and the percentage using the mainstem channel itself will be estimated.

Proposed Scope of Work

Listed below are major incremental tasks for completing the proposed program. Contract work described is expected to last for approximately one year.

Task 1: Project Planning and Coordination

* Consult local and agency specialists or representatives

* Form a technical advisory committee (TAC)
* Prepare QAPP or ERMP and submit to TAC for peer-review
* Identify sites for the fixed-location receivers and obtain permission to use
* Identify mobile monitoring routes and prepare field monitoring schedules
* Obtain or order the required project materials and equipment
* Hire additional seasonal personnel

Task 2: Pre-Survey Preparations

* Set up monitoring sites and check equipment for proper operation
* Verify the reception clarity for each site.
* Train personnel on telemetry, water quality monitoring, fish collection, tagging, data acquisition, and QA/QC procedures.
* Maintenance check of boats to ensure they are functioning properly
* Monitor environmental conditions for proper temperature regimes

Task 3: Execute Monitoring Study

* Capture salmon using a drift net, tag with ultrasonic transmitters, record fish capture data, fish length, environmental data, collect scale and adipose fin tissue samples.
* Conduct mobile monitoring of tagged salmon, record the water quality conditions, and fish location (GPS) at each contact, and note any observed mortalities.
* Download data from each fixed monitoring site to data loggers and verify proper operation every three days.

Task 4: Data Entry and Quality Assurance

* Check data sheets for completeness before the end of each field shift
* Recheck data sheets for accuracy and key enter data into a database
* Transfer data from data loggers to PC and check data for any discrepancies and correct any errors
* Key entered data will be checked line by line for errors

Task 5: Data Analyses and Reports

* Analyze data to determine salmon migration routes, migratory rates, mortalities and any delays or blockages associated with the south Delta or head of Old River temporary barriers or low DO sags.
* Prepare quarterly and final reports of the monitoring program to discuss the project status, interim and final results, and recommendations for enhancement of salmon passage.

Location and Geographic Boundaries of the Project

The project will be conducted within the Delta Basin Region, mainly in San Joaquin and Contra Costa Counties with two fixed monitoring sites in Sacramento County (Figure 1).

Expected Benefits

The proposal focuses on describing the migratory behavior of ***"San Joaquin . . . fall-run chinook salmon, a CALFED 1st Tier primary priority species"*** that must move through the mainstem river and Delta channels influenced by multiple stressors (CALFED 1998a, Attachment C). Fall-run chinook salmon from the San Joaquin River tributaries has been designated a species of special concern by the USFWS. Listed below are the CALFED stressors affecting the fish passage of this priority species in the San Joaquin River and south Delta and the benefits (in italics) of the proposed study:

I. Alternation of Flows and Other Effects of Water Management Rank = High

* **Hydrograph Alterations:** The ISDP and HORB barriers can alter hydrology of flows in mainstem and south Delta that may indirectly affect fish upstream movement through changes in water temperature, attraction or flushing flows. These effects may be benefit or impede the overall passage of chinook salmon. ***The immediate project benefits are discussed in the next subsection.***
* **Migration Barriers:** The proposal will examine possible blockages and delays caused by the physical barriers, insufficient flow over fish passage features ("notch"), and adverse water quality conditions (e.g., DO sag, high water temperature). The study will assess the risk of barriers to movement of migrating chinook salmon. Significant delays or blockages could decrease the spawning success and genetic integrity of San Joaquin River populations through increased physical injury or predation, decreased spawning readiness, altered run timing, or increased straying. ***Depending on the cause(s) of any observed delays or blockages, expected immediate benefits would be the identification of such stressors and the recommendation of appropriate remediation actions such as fish bypass features, flow changes or augmentation, or improvements in water quality. Limited use of Middle and Old River as a migration route or lack of significant delays associated with Delta barriers or water quality conditions would validate current fish management programs and enhance current impact monitoring studies or CALFED restoration plans for the upper river basin.***

II. Water Quality Rank = Medium/High

Increased Nutrient or Carbon Input: Municipal wastewater treatment discharges have caused low DO concentrations in the Stockton Deep Water Channel and downstream in the San Joaquin River of sufficient size to block the upstream passage of chinook salmon in the 60's. Although the installation of the HORB and enhanced operations of the Stockton wastewater plant has improved water quality, periods of low dissolved concentrations (< 6 mg/L) persist in the San Joaquin River. ***Major benefits would include describing the timing and extent of low DO conditions in the affected San Joaquin River and the current effects on salmon migration. The comparison of DO levels and fish movement information will better define the concentrations that DO affects fish passage and should also suggest whether new wastewater discharge requirements or flow augmentations are needed.***

III. Water Temperature Rank = High

High water temperature has been shown to block or inhibit the upstream movement of adult chinook salmon in many situations and has been cited as one cause of fish passage delays in the mainstem San Joaquin River (Hallock et al. 1970). This study would examine water temperature as a potential stressor to upstream migrating fish and evaluate its relative effect on fish movement. ***If high water temperature is a significant problem to upstream passage, an evaluation of temperature management options such as flow modifications or upstream restoration of riparian shade vegetation may be recommended.***

Background and Ecological/Biological Justification

The Interim South Delta Program is moving forward with the installation of three south Delta temporary barriers (SDTB), and evaluating and monitoring their impacts. The head of Old River barrier (HORB) is being operated to enhance spring downstream passage of juvenile chinook salmon, and reduce the DO sag in the south Delta thus enhancing adult salmon passage in the fall. The barriers and DO sags have the potential to block upstream adult salmon migration for a significant fraction of the San Joaquin River run. It is not known whether the SDTB barriers are blocking significant immigration routes for fall-run San Joaquin chinook salmon and need fish passage facilities.

There is a similar concern for the fall installation of the HORB since it has been modified from its original continuous flow-through design to an intermittent flow over the barrier's notch during some flows and tidal stages. The HORB blocks more than 50% of the available immigration routes for San Joaquin River fall-run chinook salmon. The fall installation of the HORB has not conclusively shown to adequately reduce the fall DO sag in the Stockton Deep Water Channel (SDWC). The SDWC DO sag may still be interfering with fall-run chinook salmon immigration and affecting adult escapement.

Tracking adult chinook salmon with ultrasonic tags may be the only practical method for achieving the project's objectives. Spot, short duration gill netting by DFG staff as part of DWR's SDTB Program has captured few salmon, suggesting limited use in recent years of Middle and Old Rivers, and Grant Line Canal as immigration routes. However, this sampling regime was inadequate to conclusively define patterns of chinook salmon migration, and older literature (Hallock et al. 1970) suggests these routes were used historically.

ERPP Implementation Objectives:

Specific CALFED Ecosystem Restoration Projects and Programs (ERPP) objectives addressed by this proposal are:

* "The [implementation] objective is also to ensure the restoration of . . . San Joaquin fall-run chinook salmon to support sport and viable commercial fisheries." Species and Species Group Visions, Table 8, CALFED (1998b), pg. 123 and Chinook Salmon, Implementation Objective, Targets, and Programmatic Actions, CALFED (1998b), pg. 153.
* "The implementation objective for dams, reservoirs, weirs, and other human-made structures is to increase the connection of upstream spawning and rearing habitat with the mainstream rivers in the Sacramento-San Joaquin basin in order to increase success of adult spawners . . . " Dams, Reservoirs, Weirs, and Other Structures, Implementation

Objective, Targets, and Programmatic Actions, CALFED (1998b), pg. 280.

* "Establish and maintain a hydraulic regime in the Bay-Delta to provide migratory cues, . . . , and facilitate species distribution and transport." Sacremento-San Joaquin Delta Ecological Zone, Delta Channel Hydraulics, CALFED (1998c), pg. 43.
* "Maintain net downstream flows in the mainstem San Joaquin River from Vernalis to immediately west of Stockton from September through November to help sustain dissolved oxygen levels and water temperature adequate for upstream migrating adult fall-run chinook salmon." Sacremento-San Joaquin Delta Ecological Zone, Delta Channel Hydraulics, CALFED (1998c), pg. 44.

General AFRP Objectives:

Specific Anadromous Fish Restoration Program (AFRP) objectives met by this proposal are:

* "Improve the opportunity for adult fish to reach their spawning in a timely manner; ..." pg. 4, USFWS (1997).
* "Collect fish population, health, habitat data to facilitate evaluation of restoration actions;..." pg. 4, USFWS (1997).

Mainstem San Joaquin River Objectives:

* *Action 1, High Priority:* "Coordinate with DFG and others . . . as needed to implement a flow schedule that improves conditions for all life stages of San Joaquin chinook salmon migrating through, or rearing in, the lower San Joaquin River." pg. 93, USFWS (1997).
* *Action 4, High Priority:* "Maintain the 6 mg/L dissolved oxygen standard during September through Novemeber in the San Joaquin River between Turner Cut and Stockton, as described in the SWRCB's 1995 Water Quality Control Plan." pg. 94, USFWS (1997).
* *Evaluation 2, High Priority:* "Identify and implement actions to maintain suitable water temperatures or minimize length of exposure to unsuitable water temperatures for all life of chinook salmon in the San Joaquin River and Delta." pg. 95, USFWS (1997).

Sacramento-San Joaquin Delta:

* *Supplemental Action Not Requiring Water, High Priority:* "Construct and operate a barrier at the head of Old River to improve conditions for chinook salmon migration and survival if Evaluation 1 determines that a barrier can be operated to improve conditions with minimal adverse effects on other Delta species." pg. 104, USFWS (1997).

The main benefit of this project is informational and critical for the restoration efforts for the San Joaquin River fall-run chinook salmon stocks. The effects of lower San Joaquin River or south Delta blockages or delays of chinook salmon could severely offset the benefit of costly upstream habitat and flow improvements being negotiated by the agencies and stakeholders and planned by CALFED.

Monitoring and Data Evaluation

If required, a formal Ecological and Biological Monitoring Plan (EBMP) will be prepared and submitted. A Quality Assurance Project Plan (QAPP) will be prepared. Specific methods for biological monitoring and project tracking will be described in detail with either the draft QAPP

or EBMP document. The selected document will include constituents to be monitored, list specific study objectives, state monitoring methods or procedures, provide data analysis methodology, describe the project's QA/QC objectives, and state methods for monitoring these objectives. Qualitative and quantitative evaluation of the project progress and success will be accomplished through preproject preparation and submission of 1) a detailed work breakdown structure and 2) a reviewed QAPP or EBMP, 3) publication of quarterly status reports and 4) by their distribution to a technical advisory committee (TAC), the CALFED contract manager, and other appropriate representatives for peer review. A future fish facilities technical team or Interagency Ecological Program(IEP) project work team may be used in place of a TEC. Each quarterly report will include a brief description of the tasks completed, technical problems identified or resolved, and financial summaries. Within six months of the completion of the program, a final report will summarize all major tasks, any accomplishments, and recommendations for the continuation of the monitoring program or changes in the operations of the south Delta or head of Old River temporary barriers.

Implementability

DFG staff has begun informal consultation regarding environmental review, incidental take, or permit requirements needed to conduct the monitoring program. DFG staff has also contacted the appropriate public agency representatives about preparation and future implementation of this proposal through submission to the (IEP) Delta Salmon Project Work Team, informal meeting with DWR-ESO biologists and program managers, and circulating the initial concept proposal through DFG management and the newly formed Central Valley Fish Facility Coordination Team. It is a new CALFED proposal, and local support is expected when funds are available. Outreach contacts with representatives of the CALFED agencies, ACOE, Delta agricultural diverters, City of Stockton, Port of Stockton, CVRWQB, and the DeltaKeepers are planned. Coordination with DFG BDD Water Project Planning and Evaluation Section staff responsible for the ISDP monitoring, and fish passage specialists from DFG Inland Fisheries Divison, DWR, USFWS, and USBR has already begun.

Budget Costs

DFG is requesting a maximum of $348,875 over a one year period with approximately $90,000 paid during the State Fiscal Year 1998/1999 with the remainder funds available in FY 1999/2000. Table 1 provides the specific breakdown costs. DFG will ask DWR to share some capital cost of the telemetry equipment, or underwrite some of the personnel services. DFG BDD Water Project Planning and Evaluation Section staff may provide limited technical and field monitoring assistance.

Schedule Milestones

The following milestones are congruent with the Tasks shown "IV, b. Proposed Scope of Work", and the DFG would bill costs affiliated with each task that are actually incurred in two lump sum bills covering the periods 7/1/98 -6/30/99, and 7/1/99-3/31/2000.

Task 1. Project Planning and Coordination. Form technical advisory committee, consult with other agencies, prepare QAPP/ERMP, select monitoring routes and sites, acquire permission to use sites, prepare field monitoring schedules, purchase materials and equipment, and hire additional seasonal personnel. Start Date: 3/1/99 End Date: 8/14/99. Budget sub-total: $112,866. Deliverables:Reviewed QAPP or ERMP, map showing fixed receiver sites and field operation routes, list of materials and equipment ordered or obtained, incident take consultation and permits completed.

Task 2. Pre-Survey Preparations. Set up monitoring sites, train personnel on fish collection and monitoring procedures, perform boat maintenance checks, and monitor temperature regimes. Start Date: 8/15/99 End Date: 9/14/99. Budget sub-total: $13,559. Deliverables:Complete installation of fixed site equipment, submit monitoring site suitability and equipment operation checklists, all field personnel undergone scheduled training, pre-study surveys completed.

Task 3. Execute Monitoring Study. Capture and tag adult salmon, collect biological data and samples, monitor movement of tagged salmon, note mortalities, and download/maintain fixed monitoring stations. Start Date: 9/15/99 End Date: 11/13/99. Budget sub-total: $195,627. Deliverables:Collect data from the fixed-location receivers and mobile monitoring team during study period.

Task 4. Data Entry and Quality Assurance. Data is quality checked for accuracy and entered into a data base. Start Date: 9/15/99 End Date: 12/30/99. Budget sub-total: $8,653. Deliverables:QA/QC'd data up on the DFG-Bay/Delta Division and IEP server for Internet access by 12/30/99.

Task 5. Data Analyses and Reports. Analyze data, and prepare quarterly and final reports. Start Date: 11/15/99 End Date: 3/30/2000. Budget sub-total: $18,170. Deliverables: Final IEP Technical Report published by 4/2000; Spring/Summer IEP Quarterly Newsletter article, 4-8/99, depending on submission deadlines and availability of newsletter space; talk or poster at the 2/2000 IEP Conference and 3/2000 Cal-Neva AFS Meeting.

Third Party Impacts

No third party impacts have been identified at this time.

Applicant Qualifications

This project will be conducted by the Fish Facilities Research Unit (FFRU), lead by Robert Fujimura, and staffed by George Edwards, Doug Killam, Ramiro Soto, Paul Macias and various temporary Scientific Aides. This Unit is within the Fish Facilities Program supervised by Kevan Urquhart, of the DFG Bay-Delta Division. This Division of the DFG has been conducting applied research on the S.F. Bay and Sacramento-San Joaquin Delta for more than 35 years, and the Fish Facilities Program has been conducting applied bioengineering research on fish passage, screening, and agricultural/municipal/SWP/CVP diversions for more than 25 years. All staff listed, with the exception of Mr. Soto have received specialized training in this topic area via the US Dept. of the Interior-National Ecology Training Center's 5-day course in Fish Passageways & Diversion Structures. Administration and technical oversight will be provided by Mr. Urquhart. The project will be lead by Mr. Fujimura, who will be responsible for the technical details, project management, report writing, and data analysis, assisted by Mr. Killam. The field project will be conducted by Mr. Killam, Soto, and Macias, with other temporary staff. Short staff biographies are included below and complete resumes can be obtained by contacting Mr. Urquhart.

Kevan A. F. Urquhart: A.B in Zoology U.C. Berkeley 1980, M.A. in Biological Sciences Ca. St. Univ. Fullerton 1984, Land Use & Environmental Planning Certificate U.C. Davis 1995; **Senior Biologist Supervisor** (Marine/Fisheries), Fish Facilities & Laboratory Support Programs; 3/95-current: Program Leader ($1,420,00; 24+staff) for monitoring and evaluating fish passage, large scale diversion, and screening projects in the Sacramento-San Joaquin Delta/San Francisco Bay-Estuary. Member of the Interagency Ecological Program (IEP) Management Team. Coordinate with other agencies; member CAL-FED 'Diversion Effects' and 'Interagency Fish Facilities Technical' Teams. Joined DFG in 1985 at the Bay-Delta Division in Stockton, served there as a Range B Fishery Biologist on the Sturgeon, Adult Striped Bass (SB), Resident Fishes, and SB Health Monitoring Studies; promoted to the Selenium Verification Study as an Associate Water Quality Biologist; worked as the Associate Fishery Biologist with the IFD's Klamath-Trinity River Basin Salmon & Steelhead Program, and an Environmental Specialist (ES) III with the ESD's Stream Flow & Habitat Evaluation Program, before being promoted back to Bay-Delta in his current position. An American Fisheries Society Certified Fishery Professional, and a member of the American Institute of Fishery Research Biologists.

Robert W. Fujimura: B.S. in Fisheries and B.A. in Biology Humboldt State Univ. 1977, Limnology Program, Uppsala Univ. (Sweden) 1980, M.S. in Natural Resources (Fisheries) Humboldt State University 1986. **Associate Biologist** (Marine/Fisheries), Fish Facilities Program, 5/96-present. Principal Investigator and Lead Person for FFRU, responsible for the development, execution, analysis, and reporting of field and laboratory investigations of new and existing fish passage facilities in Sacramento-San Joaquin Estuary. Participates with the CALFED Fish Facilities Technical Team and with other interagency teams involved with fish screening or passage issues. Became the Division's specialist on fishery hydroacoustic monitoring. Leading an adult salmon passage monitoring program for mitigation measures for the Suisun March Salinity Control Gates (SMSCG). Coordinates DFG field and laboratory assistance to the UCD Fish Treadmill Project and acts as a technical advisor to the project. Directs up to three

biologists, two FW Assistants, and several Scientific Aides. Joined DFG in 1987 at the Bay-Delta Division in Stockton, served there as a Range B Fishery Biologist on the Young Striped Bass Program and helped design and direct field and laboratory studies for egg and larval striped bass monitoring program. Promoted to Associate Water Quality Biologist and later to ES III as the Principal Investigator and Lead Person of the DFG Aquatic Toxicology Laboratory, responsible for the development, execution, analysis, and reporting of toxicological studies and experiments at this facility until returning to Bay-Delta to serve in his current position.

Douglas S. Killam: B.S. in Forest Products 1985, M.S. in Forest Resources Penn. State Univ. 1987. **Fishery Biologist, Range B**, Fish Facilities Program and Real Time Monitoring Program (RTM), 5/97-present. Assists in the design and implementation of laboratory and field investigations for FFRU. Helped design the captive dummy tag experiments for juvenile chinook salmon and trained staff on surgical implanted techniques for biotelemetry. Assists with fish behavioral experiments for the UCD Fish Treadmill Project. Responsible for daily operation of RTM, staff scheduling, training, gear acquisition, and field crew leading. Worked as a U.S. Peace Corps aquaculture extension agent in Zaire and taught aquaculture and fisheries management. Recorded and analyzed commercial catch data from an arctic fishing vessel as an NMFS Observer. Collected striped bass creel census data and conducted field sampling for salmon surveys in the Bay-Delta area as a DFG Scientific Aid. Conducted field investigation using screw traps, electrofishing gear, fyke nets, beach seines, and SCUBA observations of anadromous fish in the upper Sacramento River as an USFWS Biological Sciences Technician. Joined DFG Bay-Delta in 1997. Has obtained technical training certifications as an NMFS observer, in aquaculture, fish telemetry, and fish passage issues.

Paul C. Macias: course credits in Administration of Justice, Merced Community College and in Biology, American River College. **Fish and Wildlife Assistant I**, Fish Facilities Research Project, 12/95-present. Assists biologists with biological sampling, fish identification, numeration, data recording, and equipment maintenance. Frequently works as the small boat operator and field crew leader for the Unit and other DFG Bay-Delta projects, such as the Georgianna Slough Acoustical Barrier (GSAB) Project, Delta Smelt Project, North Bay Aqueduct Project, S.F. Bay Study, and RTM. Participates as a laboratory observer\crew leader for the UCD Treadmill Project. Joined DFG in 1981 as a Fish and Wildlife Seasonal Aid and helped the regional biologist for Merced County for three terms. Assisted the spawning and rearing of chinook salmon at the DFG Merced River Fish Facility for two terms. Promoted to Fish and Wildlife Assistant I in 1987 and worked as the primary laboratory and field support technician to the DFG Water Pollution Control Laboratory.

Ramiro Soto: Fish and Wildlife Assistant I, Fish Facilities Research Project, 1/92-present. Assists biologists with biological sampling, fish identification, numeration, data recording, and equipment maintenance. Often works as the small boat operator and field crew leader for the Unit and other DFG Bay-Delta projects, such as the Delta Smelt Project, North Bay Aqueduct Project, and RTM. Acts as a laboratory crew leader for the UCD Treadmill Project. Helped capture, tag, and track adult chinook salmon with radio and ultrasonic tags for barrier passage studies at the SMSCG and the GSAB. Also participated in the ultrasonic tracking of striped bass at Clifton Court Forebay. Worked seven terms as a Scientific Aid for DFG Region 4

constructing and installing fish screens, artificial fish habitat structures for reservoirs, fish ladders, and fish traps. Lead CCC crews in habitat restoration projects and worked on creel censuses.

Compliance with Standard Terms and Conditions

The applicant agrees to the standard terms and conditions provided in Attachment D and the required form, Item 3 "Standard Clauses - Interagency Agreements" in CALFED (1998a). A copy of the terms and conditions are attached.

References Cited

CALFED Bay-Delta Program. 1998a. Proposal solicitation package. May 1998. Ecosystem Restoration Projects and Programs.

CALFED Bay-Delta Program. 1998b. Ecosystem Restoration Program Plan Volume I. Visions for ecosystem elements. Draft Programmatic EIS/EIR, Technical Appendix. March 1998. Ecosystem Restoration Projects and Programs.

CALFED Bay-Delta Program. 1998c. Ecosystem Restoration Program Plan Volume II. Ecological zone vision. Draft Programmatic EIS/EIR, Technical Appendix. March 1998. Ecosystem Restoration Projects and Programs.

Hallock, R. J., R. F. Elwell, D. H. Fry, Jr. 1970. Migration of adult king salmon *Oncorhynchus tshawytscha* in the San Joaquin Delta as demonstrated by the use of sonic tags. California Department of Fish and Game Fish Bulletin 151.

United States Fish and Wildlife Service (USFWS). 1997. Revised draft restoration plan for the Anadromous Fish Restoration Program. May 30, 1997.

Table 1- Preliminary Breakdown of Adult Salmon Monitoring Program in San Joaquin River

Project Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor	Service Contracts	Material & Acquisition Contracts	Miscellaneous & Other Direct Costs	Total Cost
Task 1 Project Planning & Coordination	896	$21,876	$17,700		$67,250	$6,040	$112,866
Task 2 Pre-Survey Preparations	224	$8,565	$2,127		$500	$2,367	$13,559
Task 3 Execute Monitoring Study	7,152	$111,202	$30,680			$53,745	$195,627
Task 4 Data Entry & Quality Assurance	360	$6,620	$1,320			$713	$8, 653
Task 5 Data Analyses & Reports	416	$13,060	$2,850			$2,260	$18,170
							Total Cost: **$348,875***

*** Note: Monitoring costs would be $18,300 less if equipment is leased.**

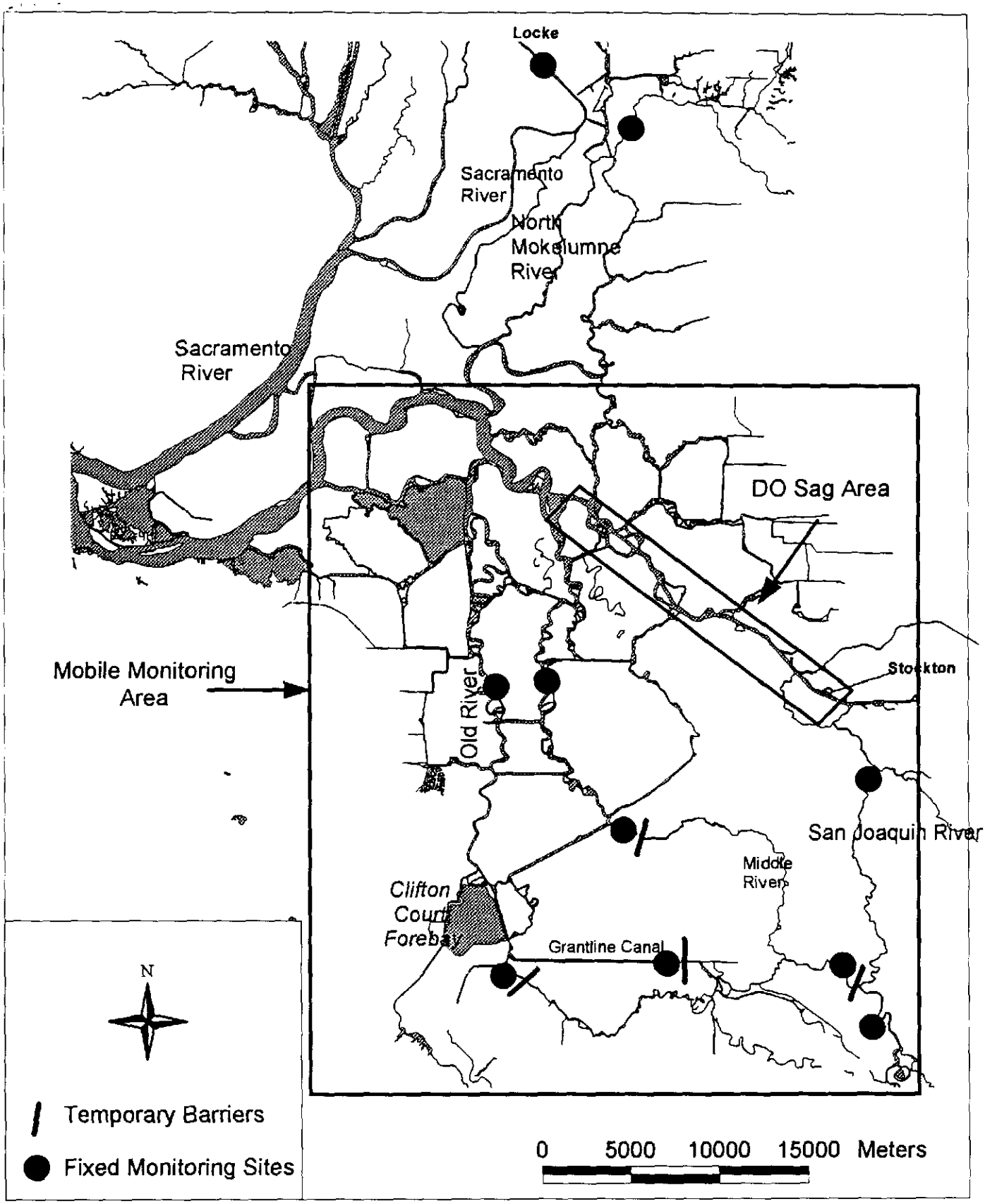

Figure 1. Adult Salmon Telemetry Monitoring Area

Attachment D
Terms and Conditions for State (CALFED) Funds

This section provides contract terms and conditions applicable to contracts issued in this budget category/topic. The specific terms and conditions may vary, depending on the applicant category (State entities, Federal and other public entities, non-profit organizations, and private entities), and the type of project (Public Works/Construction or Services), as identified in Table D-1.

Specific documents that should be submitted with the proposal are shown in Table D-1.

The general terms and conditions which will apply to Category III contracts funded with Proposition 204 funding are provided below.

In addition to these general terms and conditions, specific additional standard clauses will be applicable depending on the type of project and applicant category. Table D-1 provides a summary of those standard clauses for different types of projects and different applicant categories. Those standard clauses are provided at the end of this attachment.

1. Term of Contract: The term of the agreement will be dependent on the project and may range from 1 to 3 years. The agreement shall not become effective until fully executed by the parties and approved by CALFED.

2. Payment Schedule: No funds will be disbursed by State or NFWF to Contractor without 1) an executed copy of the Contract, (2) receipt of an original invoice with supporting documentation, and (3) receipt and satisfactory completion of deliverables and/or phases of work as set forth in the agreement, including quarterly financial and programmatic reports. Payments shall be in arrears on a monthly basis or after completion of agreed-upon project phases.

3. Budget Variances: Variances which exceed ten percent of a project task's approved budgeted amount should have approval in advance, with written explanations of programmatic changes to cover such variances and to remain within the maximum contract amount.

4. Subcontracts: Contractors are responsible for all subcontracted work. Subcontract terms and conditions should include all applicable contract terms and conditions as presented herein. Subcontractor agreements require approval by the State or NFWF, unless the subcontract is already a part of the contract agreement. Any amendments to subcontract should be approved by the State or NFWF. In obtaining subcontracts, contractor should obtain at least 3 competitive bids, or comply with the provisions of Government Code 4525 et seq., as applicable, or provide written justification for non-compliance with these requirements.

5. Substitution: Should the State or NFWF be dissatisfied with the work of subcontractors or employees of the contractor, the State or NFWF may require the contractor to substitute different qualified subcontractors or employees. The State or NFWF must approve such substitutions in *advance of providing applicable services.*

6. Conflict of Interest: Contractor shall comply with all applicable State laws and rules pertaining to conflict of interest, including but not limited to Government Code 1090 and Public Contract Code 10410 and 10411.

7. Standard of Professionalism: Contractor shall conduct all work consistent with the professional standards for the industry and type of work being performed under the contract.

8. Rights in Data: All data and information obtained and/or received under contract shall be in the public domain. Contractor shall have the right to disclose, disseminate and use, in whole or part, any final form data and information received, collected and developed under this agreement, subject to inclusion of appropriate acknowledgment of credit to the State or NFWF, CALFED, and all cost sharing partners for their financial support. Use of draft data requires pre-approval by State or NFWF and CALFED. Contractor shall not sell or grant rights to a third party who intends to sell such product as a profit-making venture.

9. Indemnification: The Contractor agrees to indemnify, defend and save harmless the State or NFWF, CALFED Agencies, the Resources Agency, or Department of Water Resources, its officers, agents and employees from any and all claims and losses accruing or resulting to any or all contractors, subcontractors, material persons, laborers, and any other person, firm or corporation furnishing or supplying work services, materials or supplies in connection with the performance of this contract, and from any and all claims and losses accruing or resulting to any person, firm or corporation who may be injured or damaged by the Contractor in the performance of this contract.

10. Independent Status: The Contractor, and the officers, agents and employees of Contractor, in the performance of the contract, shall act in an independent capacity and not as officers or employees or agents of the State of California, NFWF, CALFED Agencies, the Resources Agency, or Department of Water Resources.

11. Termination Clause: The State or NFWF may terminate this agreement and be relieved of the payment of any consideration to Contractor should Contractor fail to perform the covenants herein contained at the time and in the manner herein provided. In the event of such termination the State or NFWF may proceed with the work in any manner deemed proper by the State. The cost to the State shall be deducted from any sum due the Contractor under this agreement, and the balance, if any shall be paid the Contractor upon demand.

12. Assignment: Without the written consent of the State, this agreement is not assignable by Contractor either in whole or in part.

13. Integration Clause: No alteration or variation of the terms of this contract shall be valid unless made in writing and signed by the parties hereto, and no oral understanding or agreement not incorporated herein, shall be binding on any of the parties hereto. This contract may be amended upon mutual written agreement of the parties and approved by State or NFWF and CALFED.

14. Consideration: The consideration to be paid Contractor as provided herein, shall be in compensation for all of the Contractor's expenses incurred in the performance hereof, including travel and per diem, unless otherwise expressly so provided.

15. Severability: If any provision of this contract is held invalid or unenforceable by any court of final jurisdiction, it is the intent of the parties that all other provisions of this contract be construed to remain fully valid, enforceable, and binding on the parties.

Table D-1: Standard Contract Clauses and Related Proposal Submittal Requirements

	Standard Clauses and Proposal Requirements (see Note 1)	Services/Consulting/Preconstruction/ Research				Public Works/Construction			
Item (Note 2)		Agency*	Public*	Non-profit	Private	Agency*	Public*	Non-profit	Private
1	*Public Entities*		FC	-			FC		
2	Service and Consultant with Non Public Entity			FC	FC			FC	FC
3	Interagency	FC				FC			
4	Public Works						FC	FC	FC
5	Insurance Requirements						FC	FC	FC
6	Bidders Bond or other Security *(if contract value > $107,000)* see Note 3							P	P
7	Non-Discrimination Compliance		P	P	P		P	P	P
8	Certificate of Insurance						FC	FC	FC
9	Payment Bond						FC	FC	FC
10	Non Collusion		P	P	P				
11	Small Business Preference				P				P
n/a	Proof of Contractor's License							P	P

Note 1: All contract terms apply to any subcontracts made by contractor.

Note 2: Item numbering refers to the copies of the documents as attached following this table.

Note 3: Types of security include cashiers check, cash, certified check or bidder's bond in an amount equal to 10 percent of the amount of the proposal.

* Agency: State of California agencies, including State (California) Universities.
Public: Federal agencies and other public entities, such as city, county, other local government entities, resource conservation districts, and out-of-state public universities.

ITEM 3

Agreement No. _____

Exhibit _____

STANDARD CLAUSES -
INTERAGENCY AGREEMENTS

Audit Clause. For contracts in excess of $10,000, the contracting parties shall be subject to the examination and audit of the State Auditor for a period of three years after final payment under the contract. (Government Code Section 8546.7).

Availability of Funds. Work to be performed under this contract is subject to availability of Category III funds through the State's normal budget process.

Interagency Payment Clause. For services provided under this agreement, charges will be computed in accordance with State Administrative Manual Section 8752.

Termination Clause. Either State agency may terminate this contract upon 30 days advance written notice. The State agency providing the services shall be reimbursed for all reasonable expenses incurred up to the date of termination.